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A Fusion Network for Nautical On-Board Communications

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ABSTRACT

Modern maritime on-board communications have to be improved for safety and security. Current technology provides ease and expediency together to the crew and passengers with the help of ubiquitous technologies. Making use of Wireless Sensor Network (WSN) on board is a current custom of implementing ubiquitous technology for ships as it is important for an on-board communication system which provides reliability and flexibility for handling emergency situations. Two key phases of this scheme are: merging different on-board communiqué networks into a fusion system and enabling the cooperation between them; smoothly incorporating these networks with a consideration of backward compatibility, ease of deployment and association to shore via Internet. A combined integration move towards is selected based on comprehensive analysis.

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1. INTRODUCTION

Communication is mandate for maritime security, integrated operations and for safety infotainment principles. Ship Communication can be characterized based on the route between source and destination, e.g., ship-to-ship, ship to-shore and the on-board case. Analysis of wired short cuts in wireless sensor networks is explained by [1]. Maritime on-board communication is taken into consideration which provides basic data for the other two types. Group of users in local communication includes onboard equipment, crew, cargo elements and passengers. A characteristic of wireless sensor network for full-scale ship application is discussed by [2]. Onboard infrastructures and services support the user's communication, such as workforce tracking system and a wireless local area network (WLAN). Current communication resolution onboard are not agreeable because it contain only a monitoring system covering only necessary equipment based on wired sensor networks. Safety and security can been enhanced more if additional exhaustive monitoring on a larger quantity of user groups on board is obtained. ZigBee-based sensor network for shipboard environments is described by [3]. Deploying full-blown wired SN on a ship leads to complexity. Subsequently, additional papers have reported the experimental outcomes of executing WSN technology on ships. Although feasibility can be justified from the literature, authentic deployments still meet difficulties. A case for hybrid sensor networks is discussed by [4]. This idea was implemented in an energy-efficiency purpose. These schemes are applied for the ship application mainly for tackling the connectivity challenges and for increasing system reliability. A characteristic of wireless sensor network for full-scaleship application is described by [5]. Therefore, in addition to wires, we also integrate the sensor network with other more established or to-be-established networks, such as a WiFi-based mesh network, the crew/passenger network, personnel tracking system, and the global Internet. Reasons for involving human beings and Internet into the picture are explained as follows. Sensor monitoring systems on board are used for detecting abnormal operations, disordered equipment and for fire prevention. The one simulator for DTN Protocol Evaluation is discussed by [6]. Quick human being response is usually required confusion or irregularity is identified. In this sense, it is best that team bearing cell phones can take an interest in the monitoring progression anytime and anywhere.

Also, it is enviable that crew-carried devices can perform versatile sensing and information gathering as well, especially for the period of scheme failures. Integrated wireless communication architecture for maritime sector is described by [7]. If this on-board monitoring system can be flawlessly included with Internet, a decisive goal of upcoming anticipate maritime shipping – incorporated process for ships - will become feasible, where functions and work force can be migrated from ship to shore based on well-organized land-based control, remote safeguarding, and real-time scrutiny and so on. Delay-Oriented data traffic migration in maritime mobile communication environments are discussed by [8].

In order to test that the incorporated fusion on-board network will increase communication effectiveness and system consistency, to estimate a quantity of familiar scenarios, i.e., data gathering in a monitoring sensor network, data dissemination for workforce tracking, and direct communiqué. Isolation, Optimization and Extraction of Microbial Pigments from Marine is described. In addition, we investigate different methods of integrating WSNs with external networks, and present selection based on thorough analysis taking into consideration both deployability and the fastidious maritime circumstance. Shrimp shell wastes using immobilized marine is discussed accordingly. Bellman-Ford routing algorithm was analysed and the flow of data between protocol layers such as Application layer, Transport layer, Network layer, MAC Layer, Physical layer is discussed in [9].

A conventional nautical communication resolution can be illustrated as a wired on-board examining system associated to a LAN which interrelated with the Internet through satellites as shown in Figure 1.

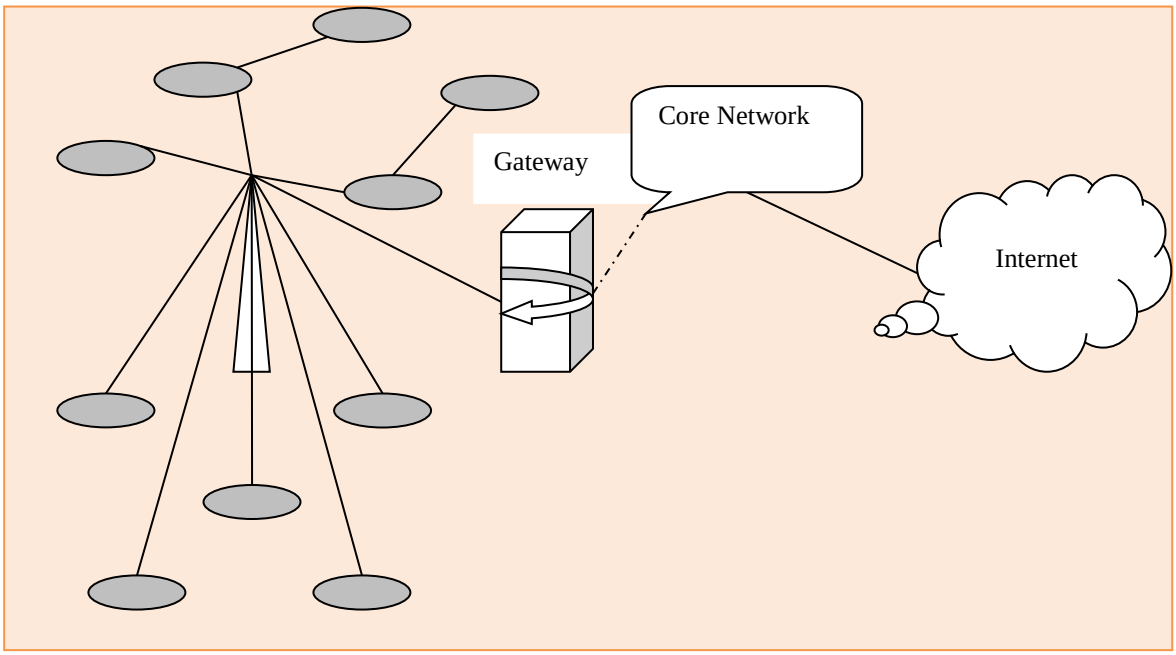

Figure 1. Maritime Communication Approach

2. MONITORING ABNORMAL OPERATION OR DISORDER OF EQUIPMENT

A ship has various types of equipment onboard, and they are individually related to each other. A breakdown of any equipment leads problem to other equipment or it may cause damage to the main engine itself, and these results to abnormalities in the ship's function. Consequently, it is significant to supervise equipment as much as because it is feasible to prevent the system failures by monitoring the equipments continuously. The current means of monitoring ship equipment are based on wired sensor networks, and the sensed data is collected and transmitted to the control server in the engine room in real time since WSN technology was included to improve this situation.

2.1. For Environmental Measurements

Safety on board as to be continuously guaranteed since crew and passengers desire to live comfort on ships, provided by ensured calm living conditions, such as repeatedly controlled warmth, moisture, and similar environmental factors. It is not so easy to get external help if any disaster occurs on ships, e.g., fires

and outburst. Hence, it is of high importance to thwart emergency circumstances from occurrence actual incident. This can be accomplished by real-time ecological monitoring of hazardous areas and alleged. WSN technology is elective here for supervising areas like walls or above the ceiling or for a large quantity of cargo containers.

2.2. For Personnel Tracking and Locating

The observation of passengers can help alarm them while they are close up to a dangerous zone. Radio Frequency Identification (RFID) is the well known ubiquitous technology used for tracking personnel consists. RFID based examining system being installed separately on shipboard and quite costly. If personnel monitoring scheme based on the WSN technology and being included with some other active data networks, then communication competence and stead fastness will be increased at no additional cost.

2.3. Fusion On-Board Communication Network - Integration

Implementing ubiquitous technology on board a ship for local communications is considered so far. A hybrid on-board sensor network is formed by including sensor nodes (wirelessly characterised), wired sensor nodes, mobile nodes and Wi-Fi nodes. This fusion network can be used to envelop all scenarios. Since the network presentation of a WSN on board depends robustly on the employment of sensor nodes in real scenarios, which differs from ship to ship, it is preferable that more common optimization machineries can be applied, prior to any real-life functioning. This fusion method proposed increases communication effectiveness and scheme stead fastness by growing system assortment from integrating dissimilar schemes, e.g., concerning communication infrastructures and taking advantage of mobility of some specific nodes (crew carrying mobile devices).

3. SIMULATION ANALYSIS

The various sensor nodes are present in the network to obtain fusion or hybrid network and the simulation tool used for the analysis is Network Simulator – 2.

3.1. Personnel Monitoring Scenario

The data delivery rate of data transmission with respect to various node communication is simulated and shown in the figure 2,

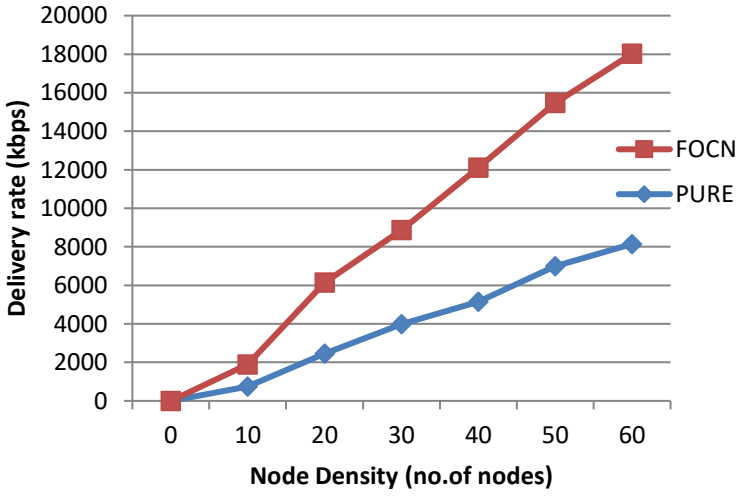

Figure 2. Delivery Ratio

4. CONCLUSION

A fusion or hybrid on-board network consists of miscellaneous communication systems was commenced to deal with the challenge and to switch crisis situations. An investigation of integrating WSN with the TCP/IP world due to its popularity is carried out in this proposed work. From thorough analysis, it is suggested a gradual enhancement of data delivery ratio, based on a combination various sensing nodes was obtained using ubiquitous technology.

REFERENCES

[1] Chitradurga R, Helmy A. *Analysis of wired short cuts in wireless sensor networks.* IEEE/ACS International Conference on Pervasive Services. 2004; 167– 176.

[2] Paik B G, Cho S R, Park, Lee D, Bae B D, Yun J H. Characteristics of wireless sensor network for full-scaleship application. *Journal of Marine Science and Technology*. 2009; 14:115–126.

[3] Kdouh H, Zaharia G, Brousseau C, Zein G E, Grunfelder G. *ZigBee-based sensor network for shipboard environments*. CORD Conference Proceedings. 2011; 1–4.

[4] Sharma G, Mazumdar R R. A case for hybrid sensor networks. *IEEE/ACM Trans. Netw.*, 2008; 16(5):1121– 1132.

[5] Paik B G, Cho S R, Park B J, Lee D, Bae B D, Yun J H, Characteristics of wireless sensor network for full-scaleship application. *Journal of Marine Science and Technology*. 2009; 14: 115–126.

[6] Keranen A, Ott J, Karkkainen T. *The ONE Simulator for DTN Protocol Evaluation.* 2nd International Conference on Simulation Tools and Techniques. 2009.

[7] Mu L, Kumar R, Prinz A. *An integrated wireless communication architecture for maritime sector*. 4th International Workshop on Multiple Access Communications. 2011; 193–205.

[8] Mu L, Prinz A. *Delay-Oriented data traffic migration inmaritime mobile communication environments.* 4th International Conference on Ubiquitous and FutureNetworks. 2012.

[9] RK Saini, R Ritika, S Vijay. Data flow in Wireless Sensor Network Protocol Stack by Using Bellmann Ford Algorithm. *Bulletin of Electrical Engineering and Informatics*, Vol. 6, 81-87, 2017.